

What is claimed is:

1. A bias current supply circuit comprising:
  - a first bipolar transistor and a second bipolar transistor which form two emitter followers cooperating to supply a base bias current of a bipolar transistor for signal amplification;
  - a normal temperature characteristic circuit which has normal temperature characteristics increasing an amount of current supply with increasing temperature and supplies a base current to said first bipolar transistor; and
  - a reverse temperature characteristic circuit which has reverse temperature characteristics decreasing the amount of current supply with increasing temperature and supplies a base current to said second bipolar transistor.
  
2. A bias current supply circuit comprising:
  - a first bipolar transistor and a resistor which are sequentially connected in series between a power supply potential node and a ground potential node;
  - a second bipolar transistor which is connected in parallel with said first bipolar transistor;
  - a normal temperature characteristic circuit which has normal temperature characteristics increasing an amount of current supply with increasing temperature and is operated by supply of a control voltage to control a base current supplied to said first bipolar transistor; and
  - a reverse temperature characteristic circuit which has reverse temperature characteristics decreasing the amount of current supply with increasing temperature and is operated by the supply of the control voltage to control a base current supplied to said second bipolar transistor,
  - wherein a base bias current of a bipolar transistor for signal amplification is supplied from emitters of said first and second bipolar transistors which are commonly connected.

3. A bias current supply circuit comprising:

a first bipolar transistor and a second bipolar transistor which are sequentially connected in series between a power supply potential node and a ground potential node;

a third bipolar transistor and a first diode-connected bipolar transistor which are sequentially connected in series between the power supply potential node and the ground potential node;

a first resistor which is connected between a control potential node and a base of said first bipolar transistor;

a fourth bipolar transistor in which a collector is connected to the base of said first bipolar transistor, a base is commonly connected to bases of said second bipolar transistor and said first diode-connected bipolar transistor, and an emitter is connected to the ground potential node;

a fifth bipolar transistor which is connected between the power supply potential node and an emitter of said first bipolar transistor;

a second resistor which is connected between the control potential node and a base of said fifth bipolar transistor;

a third resistor and a sixth bipolar transistor which are sequentially connected in series between the base of said fifth bipolar transistor and the ground potential node;

a seventh bipolar transistor which is connected between the power supply potential node and a base of said sixth bipolar transistor;

a fourth resistor which is connected between an emitter of said seventh bipolar transistor and the ground potential node;

a fifth resistor which is connected between the control potential node and a base of said seventh bipolar transistor; and

a second diode-connected bipolar transistor and a third diode-connected bipolar transistor which are sequentially connected in series between the base of said seventh bipolar transistor and the ground potential node.

4. A bias current supply circuit according to claim 3, further comprising:

a sixth resistor which is inserted and connected between a base of said third bipolar transistor and a connection node of the base of said first bipolar transistor and said first resistor; and

a seventh resistor which is inserted and connected between the collector of said fourth bipolar transistor and the connection node of the base of said first bipolar transistor and said first resistor.

5. A bias current supply circuit comprising:

a first bipolar transistor which forms an emitter follower supplying a base bias current of a bipolar transistor for signal amplification;

a second bipolar transistor which is connected in series to said first bipolar transistor;

a normal temperature characteristic circuit which has normal temperature characteristics increasing an amount of current supply with increasing temperature and supplies a base current to said first bipolar transistor; and

a bias current compensation circuit which has the normal temperature characteristics increasing the amount of current supply with increasing temperature and suppresses an increase in said base bias current with increasing ambient temperature by supplying a base current to said second bipolar transistor to pass a part of said base bias current supplied from an emitter of said first bipolar transistor through said second bipolar transistor.

6. A bias current supply circuit comprising:

a first bipolar transistor and a second bipolar transistor which are sequentially connected in series between a power supply potential node and a ground potential node;

a normal temperature characteristic circuit which has normal temperature characteristics increasing an amount of current supply with increasing temperature and is operated by supply of a control voltage to control a base current supplied to said first bipolar transistor; and

a bias current compensation circuit which has the normal temperature characteristics increasing the amount of current supply with increasing temperature, said bias current compensation circuit controlling a base bias current of a bipolar transistor for signal amplification, which is supplied from an emitter of said first bipolar transistor, in such a manner that said bias current compensation circuit is operated by supply of the control voltage to control a base current supplied to said second bipolar transistor.

7. A bias current supply circuit comprising:

a first bipolar transistor and a second bipolar transistor which are sequentially connected in series between a power supply potential node and a ground potential node;

a third bipolar transistor and a first diode-connected bipolar transistor which are sequentially connected in series between the power supply potential node and the ground potential node;

a first resistor which is connected between a control potential node and a base of said first bipolar transistor;

a fourth bipolar transistor in which a collector is connected to the base of said first bipolar transistor, a base is commonly connected to bases of said second bipolar transistor and said first diode-connected bipolar transistor, and an emitter is connected to the ground

potential node;

a fifth bipolar transistor which is connected between an emitter of said first bipolar transistor and the ground potential node;

a sixth bipolar transistor in which a collector is connected to the power supply potential node and an emitter is connected to a base of said fifth bipolar transistor;

a second resistor which is connected between an emitter of said sixth bipolar transistor and the ground potential node;

a third resistor which is connected between the control potential node and a base of said sixth bipolar transistor; and

a fourth resistor, a second diode-connected bipolar transistor, and a third diode-connected bipolar transistor which are sequentially connected in series between the base of said sixth bipolar transistor and the ground potential node.

8. A bias current supply circuit according to claim 7, further comprising:

a fifth resistor which is inserted and connected between a base of said third bipolar transistor and a connection node of the base of said first bipolar transistor and said first resistor; and

a sixth resistor which is inserted and connected between the collector of said fourth bipolar transistor and the connection node of the base of said first bipolar transistor and said first resistor.

9. A bias current supply circuit comprising:

a first resistor and a first bipolar transistor which are sequentially connected in series between a control potential node and a ground potential node;

a second bipolar transistor in which a collector is connected to a power supply potential node, a base is

connected to a collector of said first bipolar transistor, and an emitter is connected to a base of said first bipolar transistor;

a second resistor which is connected between the emitter of said second bipolar transistor and the ground potential node;

a third bipolar transistor in which a collector is connected to the power supply potential node, a base is commonly connected to the base of said first bipolar transistor, and an emitter supplies a base bias current of a bipolar transistor for signal amplification;

a diode-connected bipolar transistor which is connected between the emitter of said third bipolar transistor and the ground potential node; and

a third resistor which is connected between the control potential node and a connection node of the emitter of said third bipolar transistor and a collector of said diode-connected bipolar transistor.

10. A bias current supply circuit according to claim 9, further comprising:

a fourth resistor which is inserted and connected between a base and the collector of said diode-connected bipolar transistor; and

a fifth resistor which is inserted and connected between the base of said second bipolar transistor and the collector of said first bipolar transistor.

11. An amplification circuit comprising:

a first bipolar transistor and a second bipolar transistor which form two emitter followers cooperating to supply a base bias current of a bipolar transistor for signal amplification;

a normal temperature characteristic circuit which has normal temperature characteristics increasing an amount of current supply with increasing temperature and supplies

a base current to said first bipolar transistor;  
a reverse temperature characteristic circuit which has reverse temperature characteristics decreasing the amount of current supply with increasing temperature and supplies a base current to said second bipolar transistor;  
and

the bipolar transistor for signal amplification which is connected between a power supply potential node and a ground potential node, a base of said bipolar transistor for signal amplification being connected to emitters of said first and second bipolar transistors, an input signal being inputted to a base of said bipolar transistor for signal amplification through a capacitor, an output signal being outputted from a collector of said bipolar transistor for signal amplification.

12. An amplification circuit according to claim 11, further comprising a choke inductor which is inserted and connected between the base of said bipolar transistor for signal amplification and the emitters of said first and second bipolar transistors.

13. An amplification circuit comprising:

a first bipolar transistor and a resistor which are sequentially connected in series between a power supply potential node and a ground potential node;

a second bipolar transistor which is connected in parallel with said first bipolar transistor;

a normal temperature characteristic circuit which has normal temperature characteristics increasing an amount of current supply with increasing temperature and is operated by supply of a control voltage to control a base current supplied to said first bipolar transistor;

a reverse temperature characteristic circuit which has reverse temperature characteristics decreasing the amount of current supply with increasing temperature and

is operated by the supply of said control voltage to control a base current supplied to said second bipolar transistor; and

a bipolar transistor for signal amplification which is connected between the power supply potential node and the ground potential node, a base of said bipolar transistor for signal amplification being connected to emitters of said first and second bipolar transistors, an input signal being inputted to a base of said bipolar transistor for signal amplification through a capacitor, an output signal being outputted from a collector of said bipolar transistor for signal amplification.

14. An amplification circuit according to claim 13, further comprising a choke inductor which is inserted and connected between the base of said bipolar transistor for signal amplification and the emitters of said first and second bipolar transistors.

15. An amplification circuit comprising:

a first bipolar transistor and a second bipolar transistor which are sequentially connected in series between a power supply potential node and a ground potential node;

a third bipolar transistor and a first diode-connected bipolar transistor which are sequentially connected in series between the power supply potential node and the ground potential node;

a first resistor which is connected between a control potential node and a base of said first bipolar transistor;

a fourth bipolar transistor in which a collector is connected to the base of said first bipolar transistor, a base is commonly connected to bases of said second bipolar transistor and said first diode-connected bipolar transistor, and an emitter is connected to the ground potential node;

a fifth bipolar transistor which is connected between the power supply potential node and an emitter of said first bipolar transistor;

a second resistor which is connected between the control potential node and a base of said fifth bipolar transistor;

a third resistor and a sixth bipolar transistor which are sequentially connected in series between the base of said fifth bipolar transistor and the ground potential node;

a seventh bipolar transistor which is connected between the power supply potential node and a base of said sixth bipolar transistor;

a fourth resistor which is connected between an emitter of said seventh bipolar transistor and the ground potential node;

a fifth resistor which is connected between the control potential node and a base of said seventh bipolar transistor;

a second diode-connected bipolar transistor and a third diode-connected bipolar transistor which are sequentially connected in series between the base of said seventh bipolar transistor and the ground potential node; and

a bipolar transistor for signal amplification which is connected between the power supply potential node and the ground potential node, a base of said bipolar transistor for signal amplification being connected to the emitter of said first bipolar transistor and an emitter of said fifth bipolar transistor, an input signal being inputted to the base of said bipolar transistor for signal amplification through a capacitor, an output signal being outputted from an collector of said bipolar transistor for signal amplification.

16. An amplification circuit according to claim 15, further comprising:

a sixth resistor which is inserted and connected between a base of said third bipolar transistor and a connection node of the base of said first bipolar transistor and said first resistor; and

a seventh resistor which is inserted and connected between a collector of said fourth bipolar transistor and the connection node of the base of said first bipolar transistor and said first resistor.

17. An amplification circuit according to claim 15, further comprising a choke inductor which is inserted and connected between the base of said bipolar transistor for signal amplification and the emitters of said first and fifth bipolar transistors.

18. An amplification circuit comprising:

a first bipolar transistor which forms an emitter follower supplying a base bias current of a bipolar transistor for signal amplification;

a second bipolar transistor which is connected in series to said first bipolar transistor;

a normal temperature characteristic circuit which has normal temperature characteristics increasing an amount of current supply with increasing temperature and supplies a base current to said first bipolar transistor;

a bias current compensation circuit which has the normal temperature characteristics increasing the amount of current supply with increasing temperature and suppresses an increase said the base bias current with increasing ambient temperature by supplying a base current to said second bipolar transistor to pass a part of said base bias current supplied from an emitter of said first bipolar transistor through said second bipolar transistor; and

the bipolar transistor for signal amplification which is connected between a power supply potential node and a

ground potential node, a base of said bipolar transistor for signal amplification being connected to the emitter of said first bipolar transistor, an input signal being inputted to the base of said bipolar transistor for signal amplification through a capacitor, an output signal being outputted from a collector of said bipolar transistor for signal amplification.

19. An amplification circuit according to claim 18, further comprising a choke inductor which is inserted and connected between the base of said bipolar transistor for signal amplification and the emitter of said first bipolar transistors.

20. An amplification circuit comprising:

a first bipolar transistor and a second bipolar transistor which are sequentially connected in series between a power supply potential node and a ground potential node;

a normal temperature characteristic circuit which has normal temperature characteristics increasing an amount of current supply with increasing temperature and is operated by supply of a control voltage to control a base current supplied to said first bipolar transistor;

a bias current compensation circuit which has the normal temperature characteristics increasing the amount of current supply with increasing temperature, said bias current compensation circuit controlling a base bias current of a bipolar transistor for signal amplification, which is supplied from an emitter of said first bipolar transistor, in such a manner that said bias current compensation circuit is operated by supply of the control voltage to control a base current supplied to said second bipolar transistor; and

the bipolar transistor for signal amplification which is connected between the power supply potential node and

the ground potential node, a base of said bipolar transistor for signal amplification being connected to the emitter of said first bipolar transistor, an input signal being inputted to the base of said bipolar transistor for signal amplification through a capacitor, an output signal being outputted from a collector of said bipolar transistor for signal amplification.

21. An amplification circuit according to claim 20, further comprising a choke inductor which is inserted and connected between the base of said bipolar transistor for signal amplification and the emitter of said first bipolar transistors.

22. An amplification circuit comprising:

a first bipolar transistor and a second bipolar transistor which are sequentially connected in series between a power supply potential node and a ground potential node;

a third bipolar transistor and a first diode-connected bipolar transistor which are sequentially connected in series between the power supply potential node and the ground potential node;

a first resistor which is connected between a control potential node and a base of said first bipolar transistor;

a fourth bipolar transistor in which a collector is connected to the base of said first bipolar transistor, a base is commonly connected to bases of said second bipolar transistor and said first diode-connected bipolar transistor, and an emitter is connected to the ground potential node;

a fifth bipolar transistor which is connected between an emitter of said first bipolar transistor and the ground potential node;

a sixth bipolar transistor in which a collector is connected to the power supply potential node and an emitter

is connected to a base of said fifth bipolar transistor;  
a second resistor which is connected between an emitter of said sixth bipolar transistor and the ground potential node;

a third resistor which is connected between the control potential node and a base of said sixth bipolar transistor;

a fourth resistor, a second diode-connected bipolar transistor, and a third diode-connected bipolar transistor which are sequentially connected in series between the base of said sixth bipolar transistor and the ground potential node; and

a bipolar transistor for signal amplification which is connected between the power supply potential node and the ground potential node, a base of said bipolar transistor for signal amplification being connected to the emitter of said first bipolar transistor, an input signal being inputted to the base of said bipolar transistor for signal amplification through a capacitor, an output signal being outputted from a collector of said bipolar transistor for signal amplification.

23. An amplification circuit according to claim 22, further comprising:

a fifth resistor which is inserted and connected between a base of said third bipolar transistor and a connection node of the base of said first bipolar transistor and said first resistor; and

a sixth resistor which is inserted and connected between the collector of said fourth bipolar transistor and the connection node of the base of said first bipolar transistor and said first resistor.

24. An amplification circuit according to claim 22, further comprising a choke inductor which is inserted and connected between the base of said bipolar transistor for

signal amplification and the emitter of said first bipolar transistors.

25. An amplification circuit comprising:

a first resistor and a first bipolar transistor which are sequentially connected in series between a control potential node and a ground potential node;

a second bipolar transistor in which a collector is connected to a power supply potential node, a base is connected to a collector of said first bipolar transistor, and an emitter is connected to a base of said first bipolar transistor;

a second resistor which is connected between the emitter of said second bipolar transistor and the ground potential node;

a third bipolar transistor in which a collector is connected to the power supply potential node, a base is commonly connected to the base of said first bipolar transistor, and an emitter supplies a base bias current of a bipolar transistor for signal amplification;

a diode-connected bipolar transistor which is connected between the emitter of said third bipolar transistor and the ground potential node;

a third resistor which is connected between the control potential node and a connection node of the emitter of said third bipolar transistor and a collector of said diode-connected bipolar transistor; and

the bipolar transistor for signal amplification which is connected between the power supply potential node and the ground potential node, a base of said bipolar transistor for signal amplification being connected to the emitter of said third bipolar transistor, an input signal being inputted to the base of said bipolar transistor for signal amplification through a capacitor, an output signal being outputted from a collector of said bipolar transistor for signal amplification.

26. An amplification circuit according to claim 25, further comprising:

a fourth resistor which is inserted and connected between a base and the collector of said diode-connected bipolar transistor; and

a fifth resistor which is inserted and connected between the base of said second bipolar transistor and the collector of said first bipolar transistor.

27. An amplification circuit according to claim 25, further comprising a choke inductor which is inserted and connected between the base of said bipolar transistor for signal amplification and the emitter of said third bipolar transistors.